Claims

1. An electrical energy generating device comprising:

a cell having at least a hydrogen electrode,

a proton conductor film,

an oxygen electrode; and

a sheet cover having an air permeability and a waterproofness, wherein said sheet cover shrouds said cell.

2. The electrical energy generating device according to claim 1 wherein said sheet cover is formed of a material selected from the group consisting of polyurethane, micro-porous polyolefin, natural protein hyperfine powder, and waterproofed polyester.

3. The electrical energy generating device according to claim 1, further comprising a water-absorbent sheet having an air permeability and a water-absorbing property which is provided inside said sheet cover, so that said water absorbent sheet shrouds said cell.

4. The electrical energy generating device according to claim 3, further comprising a casing having numerous apertures between said sheet cover and the water-absorbent sheet, wherein said casing shrouds said cell.

5. The electrical energy generating device according to claim 4 wherein said water-absorbent sheet is formed of a water-absorbent material having numerous apertures.

6. The electrical energy generating device according to claim 1, wherein said hydrogen electrode is a hydrogen electrode plate, said oxygen electrode is an oxygen

electrode plate, and said cell further comprises a hydrogen gas flow path plate in which a plurality of apertures is formed by lattice, so that a first hydrogen electrode plate, a first proton conductor film and a first oxygen electrode plate are arrayed in an order thereof in one side of said hydrogen gas flow path plate and a second hydrogen electrode plate, a second proton conductor film and a second oxygen electrode plate are arrayed in an order thereof on another side of said hydrogen gas flow path plate.

7. The electrical energy generating device according to claim 6, wherein said first hydrogen electrode plate and said second hydrogen electrode plate are each formed a plurality of apertures by lattice, said first hydrogen electrode plate and said hydrogen gas flow path plate are arrayed so that each of said apertures formed in said first hydrogen electrode plate passes through said apertures formed in said hydrogen gas flow path plate, with a first hydrogen gas channel being formed therebetween, and wherein said second hydrogen electrode plate and said hydrogen gas flow path plate are arrayed so that each of said apertures formed in said second hydrogen electrode plate passes through said apertures formed in said hydrogen gas flow path plate, with a second hydrogen gas channel being formed therebetween.

8. The electrical energy generating device according to claim 7 wherein said hydrogen electrode plate and said hydrogen gas flow path plate are arrayed so that at least a part of points of intersection of said lattice of said first hydrogen electrode plate is within the inside of said plural apertures formed in said hydrogen gas flow path plate, and so that at least a part of points of intersections of said lattice of said

hydrogen gas flow path plate is within the inside of said plural aperture formed in said first hydrogen electrode plate, with said first hydrogen gas channel being formed therebetween; and wherein said hydrogen electrode plate and said hydrogen gas flow path plate are arrayed so that at least part of points of intersection of said lattice of said second hydrogen electrode plate is within the inside of said plural apertures formed in said hydrogen gas flow path plate and so that at least a part of points of intersections of said lattice of said hydrogen gas flow path plate is within the inside of said plural apertures formed in said second hydrogen electrode plate, with said second hydrogen gas channel being formed therebetween.

9. The electrical energy generating device according to claim 7 wherein at least part of said plural apertures formed in said first hydrogen electrode plate and at least part of said plural apertures formed in said hydrogen gas flow path plate are substantially of a same shape and wherein at least part of said plural apertures formed in said second hydrogen electrode plate and at least part of said plural apertures formed in said hydrogen gas flow path plate are substantially of a same shape.

10. The electrical energy generating device according to claim 9 wherein at least part of said plural apertures formed in said first hydrogen electrode plate and at least part of said plural apertures formed in said hydrogen gas flow path plate are substantially of a same rectangular shape and wherein at least part of said plural apertures formed in said second hydrogen electrode plate and at least part of said plural apertures formed in said hydrogen gas flow path plate are substantially of a same rectangular

shape.

11. The electrical energy generating device according to claim 10 wherein said hydrogen electrode plate and said hydrogen gas flow path plate are arrayed so that at least part of points of intersection of said lattice of said first hydrogen electrode plate is coincident with center points of said plural apertures formed in said first hydrogen electrode plate, and so that at least part of points of intersection of said lattice of said hydrogen gas flow path plate is coincident with center points of said plural apertures formed in said first hydrogen electrode plate, with said first hydrogen gas channel being formed therebetween; and wherein said hydrogen electrode plate and said hydrogen gas flow path plate are arrayed so that at least part of points of intersection of said lattice of said second hydrogen electrode plate is coincident with center points of said plural apertures formed in said hydrogen gas flow path plate, and so that at least part of points of intersection of said lattice of said hydrogen gas flow path plate is coincident with center points of said plural apertures formed in said second hydrogen electrode plate, with said second hydrogen gas channel being formed therebetween.

12. The electrical energy generating device according to claim 6 wherein the thickness of said hydrogen gas flow path plate is from 0.01 mm to 1 mm.

13. The electrical energy generating device according to claim 6 wherein the thickness of each of said first hydrogen electrode plate and said second hydrogen electrode plate is from 0.01 mm to 1 mm.

14. The electrical energy generating device according to claim 6 wherein said hydrogen gas flow path plate is formed of a material selected from the group consisting of polycarbonate, acrylic resin, ceramics, carbon, hastelloy, stainless steel, nickel, molybdenum, copper, aluminum, iron, silver, gold, platinum, tantalum and titanium.

15. The electrical energy generating device according to claim 6 wherein said first and second hydrogen electrode plates are each formed of a material selected from the group consisting of hastelloy, stainless steel, nickel, molybdenum, copper, aluminum, iron, silver, gold, platinum, tantalum, titanium and alloys thereof.

16. The electrical energy generating device according to claim 6 wherein said first oxygen electrode plate and said second hydrogen electrode plate are each formed a plurality of apertures by a lattice, said cell further comprises a first air flow path plate in which a plurality of apertures is formed by a lattice and a second air flow path plate in which a plurality of apertures is formed by a lattice, the surface of said first oxygen electrode plate opposite to said first proton conductor film and said first air flow path plate are arrayed so that each of said apertures formed in said first oxygen electrode plate passes through said apertures formed in said first air flow path plate, with a first air channel being formed therebetween, and wherein the surface of said second oxygen electrode plate opposite to said second proton conductor film and said second air flow path plate are arrayed so that each of said apertures formed in said second oxygen electrode plate passes through said apertures formed in said second air flow path plate,

with a second air channel being formed therebetween.

17. The electrical energy generating device according to claim 16 wherein said first oxygen electrode plate and said first air flow path plate are arrayed so that at least part of points of intersection of said lattice of said first oxygen electrode plate is within the inside of said plural apertures formed in said first air flow path plate, and so that at least part of points of intersection of said lattice of said first air flow path plate is within said plural apertures formed in said first oxygen electrode plate, with said first air channel being formed therebetween; and wherein said second oxygen electrode plate and said second air flow path plate are arrayed so that at least part of points of intersection of said lattice of said second oxygen electrode plate is within the inside of said plural apertures formed in said second air flow path plate, and so that at least part of points of intersection of said lattice of said second air flow path plate is within said plural apertures formed in said second oxygen electrode plate, with said second air channel being formed therebetween.

18. The electrical energy generating device according to claim 16 wherein at least part of said plural apertures formed in said first oxygen electrode plate and at least part of said plural apertures formed in said first air flow path plate are substantially of a same shape and wherein at least part of said plural apertures formed in said second oxygen electrode plate and at least part of said plural apertures formed in said second air flow path forming plate are substantially of a same shape.

19. The electrical energy generating device according to claim 18 wherein at least

part of said plural apertures formed in said first oxygen electrode plate and at least part of said plural apertures formed in said first air flow path plate are substantially of a same rectangular shape and wherein at least part of said plural apertures formed in said second oxygen electrode plate and at least part of said plural apertures formed in said second air flow path plate are substantially of a same rectangular shape.

20. The electrical energy generating device according to claim 16 wherein said first oxygen electrode plate and said first air flow path plate are arrayed so that at least part of points of intersection of said lattice of said first oxygen electrode plate is coincident with center points of said plural apertures formed in said first air flow path plate, and so that at least part of points of intersection of said lattice of said first air flow path plate is coincident with center points of said plural apertures formed in said first oxygen electrode plate, with said first air channel being formed therebetween; and wherein said second oxygen electrode plate and said second air flow path plate are arrayed so that at least part of points of intersection of said lattice of said second oxygen electrode plate is coincident with center points of said plural apertures formed in said second air flow path plate, and so that at least part of points of intersection of said lattice of said lattice of said second air flow path forming plate is coincident with center points of said plural apertures formed in said second oxygen electrode plate, with said second air channel being formed therebetween.

21. The electrical energy generating device according to claim 16 wherein the thickness of each of said first air flow path plate and said second air flow path plate

is from 0.01 mm to 0.5 mm.

22. The electrical energy generating device according to claim 16 wherein the thickness of each of said first oxygen electrode plate and said second oxygen electrode plate is from 0.01 mm to 1 mm.

23. The electrical energy generating device according to claim 16 wherein said first air flow path plate and said second air flow path plate are each formed of a material selected from the group consisting of polycarbinate, acrylic resin, ceramics, carbon, hastelloy, stainless steel, nickel, molybdenum, copper, aluminum, iron, silver, gold, platinum, tantalum and titanium.

24. The electrical energy generating device according to claim 16 wherein said first and second oxygen electrode plates are each formed of a material selected from the group consisting of hastelloy, stainless steel, nickel, molybdenum, copper, aluminum, iron, silver, gold, platinum, tantalum, titanium and alloys thereof.

25. The electrical energy generating device according to claim 16 wherein said cell further comprises a first module retention plate in which a plurality of apertures is formed by a lattice, on the opposite side of said first air flow path plate with respect to said first oxygen electrode plate, and a second module retention plate in which a plurality of apertures is formed by a lattice, on the opposite side of said second air flow path plate with respect to said second oxygen electrode plate, said first module retention plate and said first air flow path plate are arrayed so that each of said apertures formed in said first module retention plate passes through said apertures

formed in said first air flow path plate and wherein said second module retention plate and said second air flow path plate are arrayed so that each of said apertures formed in said second module retention plate passes through said apertures formed in said second air flow path plate.

26. The electrical energy generating device according to claim 25 wherein said first module retention plate and said first air flow path plate are arrayed so that at least part of points of intersection of said lattice of said first module retention plate is within the inside of said plural apertures formed in said first air flow path plate, and so that at least part of points of intersection of said lattice of said first air flow path plate is within said plural apertures formed in said first module retention plate; and wherein said second module retention plate and said second air flow path plate are arrayed so that at least part of points of intersection of said lattice of said second module retention plate is within the inside of said plural apertures formed in said second air flow path plate, and so that at least part of points of intersection of said lattice of said second air flow path plate is within said plural apertures formed in said second module retention plate.

27. The electrical energy generating device according to claim 25 wherein at least part of said plural apertures formed in said first module retention plate are formed to substantially a circular shape and wherein at least part of said plural apertures formed in said second module retention plate are formed to substantially a circular shape.